Geranoaetus fragilis

Beaks of Granoaetus fragilis

D 11442, C 5356, E 850, E 3578, E 4129

Resemble Urubitinga but larger

Beak- Maxilla- palatines, unpaired anterior - splitting situated between palatines
Ethmoid? palatines, 1 anterior over the vomer (like Haliaetus)
Granoaetus with these bones joined anteriorly
Palate flat as this
as well as fossils like Urubitinga & Haliaetus.
Palate slightly grooved as this

Beaks of Granoaetus grimelli

~~Ethmoid~~ - palatines split.
Palate anteriorly - thin - long & not flat or ~~convex~~ slightly grooved as in the above, but premaxillae meet in center leaving narrow cr. crevice between
More like Aquila, but in Aquila the bones do not meet - ~~but~~ the crevice is present the wider
Central ridge ~~is~~ marked out, to junction. This portion like Granoaetus

1 29 right

Tarsometatarsus gracilis

C 752	108.0
G 2840	101.9
D 16	105.9
E 3445	101.8
B 9530	101.9
D 4869	107.0
E 3246	96.3a X
J 9864	104.1
E 2649	103.7
D 9690	103.9
C 9845	113.0 X
D 6868	109.6 X mount
J 9861	104.0
E 1903	99.8
C 8576	104.2
C 3261	108.8
D 4272	106.9
D 3001	100.9
C 3886	104.6
D 783	98.9
D 3528	113.4 X
C 7477	103.0
C 5794	101.6
C 2808	107.0
E 1577	107.3
G 2838	106.8
D 3414	106.1
E 4508	107.7
D 6713	107.8

E 3244
D 783

113	112	111	110	109	108	107	106	105	104	103	102	101	100	99	98	97	96
113,0		111,2	110,1	109,2	108,3	107,9	106,7	105,4	104,9	103,4	102,9	101,4	100,9	99,8	98,9		96,3
113,4			110,4	109,6	108,6	107,2	106,3	105,5	104,1	103,4	102,0	101,9					
			110,4	109,7	108,0	107,0	106,1	105,9	104,9	103,6	102,7	101,8					
			110,4	109,6	108,8	107,0	106,5	105,5	104,3	103,9	102,1	101,9					
						107,3	106,5	105,6	104,1	103,7	102,2	101,5					
						107,7	106,8	105,9	104,0	103,7	102,4						
						107,8	106,1		104,2	103,9							
							106,2		104,5	103,0							
							106,8										
							106,3										
							106,3										
							106,6										
							106,9										
							106,8										

113,4
96,3
17,1

105,4 = mean

113,4
96,9
14,5

113,4
100,9
12,5

2 0 1 4 4 7 15 6 8 8 6 5 1 1 1 0 1

Tarsus

fragilis

Hetero or

U. a. anthracina

U a. subtilis and

G melanoleucus

Buteo

morphnus

G. melanoleucus 2 3 3

Hetero

U. a. anthracina

U. a. subtilis

Buteo

Humerus

Ur. w.

Hetero

U. urn.

Hetero

Ulna

G. mel

Buteo

G. mel

Sternum

* Parabuteo

(Hetero)

Ur. urubitinga

U. anthracina a & b

Pelvis

U. urn.

urubitinga

asturina

Geranoaetus fagilis

Femur

Material available: 25 complete; 2 with proximal end ~~chipped~~ broken, 2 proximal ~~half~~, 3 distal half

Proximal end: Trochanter rising above iliac facet as in Geranoaëtus (not in Urubitinga)

	a length	b breadth	c depth	h distal end	ba	ca	ha
E 3626	98.9	~~19.9~~	12.7	15.8	~~19.9~~	12.8	15.9
E 3759	98.7	18.9	12.1	15.3	19.1	~~12.2~~	15.6
F 5437	97.8	19.0	11.9	14.9	19.4	12.1	15.2
C 58557	97.6	18.5'	11.8	14.8	18.9	12.0	15.1
Urubitinga 788	88.5'	17.0	10.5'	13.5'	19.2	11.8	15.2 (15.2)
Neogymnogyps C 75 11	106.2a	22.0a	——	~~17.8~~	20.7		16.9
E 2791	~~9~~ 5'a	19.6	12.1	15.6	21.6a	13.3	17.2
C 684	106.4	21.1	13.4	17.1	19.8	12.5'	16.0

	233	18471
Tarsus	114.7	105.0
Femur	112.2	102.9
Tibia	153.1	137.1
	380.0	345.0
Carpus	88.7	83.2
Humerus	160.0	145.0
Ulna	189.4	166.2
	438.1	394.4
Ratio leg & wing	86.7	87.4%

Coracoid — F. mel

233	18471
61.2	57.3

wing & cor. 14.5% (233) → 13.9

leg & cor. 16.6 → 16.1

humerus & ulna
233 — 87.4%
18471 — 87.2%

femur & hum
233 — 70.1
18471 — 70.9

	U.a.s	U.a.a	U.u	U.u	
	16950	1561.8	738	17185	wing & cor. 15.4
Tarsus	83.3	87.8	129.4	115.2	1561.8 — 14.1%
Femur	71.8	74.9	88.5	87.2	738 — 14.0% 12.7
Tibia	104.0	108.0	143.8	138.8	
	259.1	270.7	361.7	338.2	
Coracoid		41.7	45.1	44.7	
Carpus	56.3	58.4	61.5	59.2	
Humerus	104.8	109.5	120.8	119.1	
Ulna	123.9	126.6	138.6	137.8	
	285.0	294.5	320.9	316.1	
Leg & wing	90.9%	91.9%	112.7%	106.9	

Tarsus 104.2
Tibia 120.2
Femur 77.5
301.9

Coracoid 41.1

Carpus 60.5
Humerus 119.0
Ulna 138.5
318.0

Klebers

Ratio
leg to wing 94.9%
wing to cora 12.9%
leg to cora 13.6
hum to ulna 80.1
femur & hum 65.1

Spec. #	a	b	c	d	x	Ba	ca	da	xa
731	85.1	17.7	14.7	16.4	7.1	16.0	17.1	19.2	8.3
301	82.8	14.2	14.8	16.6	7.6	17.0	17.8	20.0	9.1
148	90.9	16.8	16.7	18.0	6.4	17.6	18.0	19.8	9.2
~~427~~ ? B. for ?	~~79.3~~	~~13.5~~	~~14.4~~	~~14.8~~	~~6.7~~	~~17.1~~	~~18.1~~	~~18.6~~	~~8.4~~
139	85.0	15.0	16.5	17.0	7.9	17.6	19.4	20.0	9.3
240	89.1	15.6	17.0	16.7	8.4	17.5	19.0	18.8	9.3
222	85.4	16.1	16.1	17.9	8.0	18.8	18.8	20.9	9.3

909 / 828 / 81 / Input Variation

176
909 | 1600
909
6910
6363
5470
547

793 | 1350
793
5570
5451
190

176
850 | 1500
850
6500
5950
5500

175
891 | 1560
891
6690
6237
5530

188
854 | 1610
854
7560
6832
728

180
909 | 1640
909
7310
6497
8380

181
793 | 1440
793
6470
6344
126

194
850 | 1650
850
8000
7650
3500

190
891 | 1700
891
8090
8019
71

854 | 1160

198
909 | 1800
909
8910
8181
7290

186
793 | 1480
793
6870
6344
2-260

850 | 1700
1700

188
891 | 1680
891
7890
7128
762

209
854 | 1790
1708
8200

92
909 | 8400
8184
216

84
793 | 6700
6344
3560

93
850 | 7900
7650
3500

190
171
1.9

93
891 | 8400
8089
3110

93
854 | 8000
7686
3140

177
158
1.9

91
828 | 7600
7452
1480

83
851 | 7100
6808
2920

200
828 | 1660
1636
400

193
851 | 16450
851
7890
7659
2310

178
828 | 14750
828
6520
5796
7240

171
851 | 14700
851
16190
5957
1330

Butler
Tarzo.

160
851 | 13700
851
5190
5106
840

170
828 | 14110
828
3320
5796
240

184
162
1.4
18.8
160
2.8

209
186
218
213
19.5
1.8

199
1091 | 2180
2091
10890 +
9819
10710

223
1091 | 2434
2182
2520 +
2182
3380

176
1098 | 1940
1098
8720 +
7686
7340

205
1098 | 2260
2196
4700

221
1098 | 2430
2196
2370
2196
1740

93
1098 | 10300
9882
4180

174
1111 | 1940
1111
8300
7770
5300

192
1111 | 2140
1111
10300
9990
3100

223
1110 | 2470
2220
2500
2220
3800

84
1110 | 9400
8880
5200

224 | 7600 | 329
6728
8720
6992
2080

196 | 7600 | 387
5488
12720
13,648
1520

200 | 7900 | 39
6000
1900
1800
1000

191 | 7400 | 37
5919
1490
13279
1110

191 | 7330 | 370
5911
1390
13791

196 | 8500 | 43
7848
960

184 | 7400 | 402
7360
400

Numerical Ratios

331	108.6	108.4
240		118.2
307	119.8	120.0
477	101.0	100.5
272	113.0	

Numerical Analysis

120.0
113.0
7.0

	fragilis	v. a.	a. u.	Cyrmel.	Butis	Hubeis	morphnus
leg & wing	76–79 %	90.9–91.9	112–106	86.7–87.4	93.3	94.9	
wing & cor.	12.1 12.7 %	14.1	15.4	14.5	14.0	12.9	
leg & cor.	16	15.4	12.7	16.6	15.1	13.6	
humerus breadth prox to length	18.4–7 %	18.0–18.7 %	17.5–18.1 %	19.5–20 %		17.3 %	
Tarsus breadth prox & length	14.8–16.6	15.3–16.0	11.3	17.8–18	17.6	12.9	
Tibia breadth dist to length	11.5–12.5	12.1	10.5	13.2		11.0 11.0	

Gular & frag.	nisus	mag.
87.0	81.1	93.0
164.2	156.0	172.0
252.2	237.1	265.0

M

fragilis 73
345.2) 252.210
24164
10560

73
3222) 237.10
22564
14560

71
380.1) 265.00
25907
5930

morphnus 74
4357) 32260
30499
17618
17428

70
4206) 29450
29442
3080

74
4621) 34598
32347
22430